

**2nd Six Weeks – Week 2.5****FOUNDATIONS OF FUNCTIONS UNIT VOCABULARY**

x-axis	horizontal	input	domain	dependent
y-axis	vertical	output	range	independent
pattern	relationship	rule	function	correlation
rate	rate of change	slope	variation	variable
positive	negative	increasing	decreasing	constant
quadrants	scatterplot	coordinate plane		no relationship
intercept	intersection	solution	continuous	discrete
point	origin	(x , y)	ordered pair	coordinates

**TAKS VOCABULARY REVIEW**

scale	proportion	ratio	percent	unit rate
-------	------------	-------	---------	-----------

**MATERIALS**

Cornell notes	graphing calculators	manipulatives	textbook
---------------	----------------------	---------------	----------

**AVID and ESL Strategies**

Think-Pair-Share	4 Corners	Expert/Consultant
Carousel	KWL	Frayer/Venn diagrams
Quick Write	Quick Work	Marzano's 6 Steps - Vocabulary

**TECHNOLOGY**

**Reminder:** Students will bring laptops to class.

Gizmos	On-line TEKS Related Games
Interventions	Assessments

**SPIRALING & TAKS**

Equations, proportions, ratios and percents through warm-ups.

**Algebra I Lesson – Monday, November 2, 2009****FUNCTION NOTATION; WRITING AND EVALUATING EXPRESSIONS****OBJECTIVE(S): STUDENT WILL:**

1. represent functions using function notation,  $f(x)$ ,  $g(x)$ , etc.
2. evaluate expressions (use substitution) to find the range, given the domain

**TEKS:** A.2.B - identify mathematical domains and ranges...

**VOCABULARY:** rate of change,  $f(x)$ , function notation, function rule (expression), solve, evaluate, ordered pair

**MATERIALS:**

- graphing calculators
- online stopwatch (<http://www.online-stopwatch.com/full-screen-stopwatch/>)
- 40 pennies, pebbles, paper clips, or some small items to use for counting
- Worksheets: Warmup, independent practice

**ENGAGE:** Teacher will select or solicit 1 student to participate in a demonstration. Teacher will explain to class that when (s)he says “go,” the student will begin dropping 2 pennies per second into a cup. (Display stopwatch on overhead). Teacher will lead class in using a 3-column table to arrive at an expression or function rule to represent how many pennies are in the cup over time.

- Q: What are the independent quantity and variable?
- Q: What are the dependent quantity and variable?
- Q: How do we get from the independent quantity to the dependent quantity? This expression is called our function rule.

**EXPLORE:** Teacher will select or solicit a second student to conduct a slight variation of the “penny” demonstration. Student 1 will again drop 2 pennies per second into the cup. Student 2 will be instructed to wait 5 seconds, and on the 6th second, begin dropping 2 pennies per second in his cup. Stop both students at 10 seconds. Teacher will assist class in using 3-column table to write an expression for the number of pennies in each student’s cup from the time that the second student began dropping pennies in the cup. (**student 1:**  $2s + 10$ ; **student 2:**  $2s$ )

**ELABORATE:**

- Q: If I ask you how many pennies are in student 1’s cup at 3 seconds, how would you determine the number? (Teacher, introduce  $f(x)$  notation here . . .  $f(3) = 16$ .)
- Students will work two word problems (see attached) similar to Test 2.3 questions 9 and 10, requiring them to complete a 3-column table using expressions to represent each situation.

**EXPLAIN:**

- Teacher will explain function notation.
- Teacher will demonstrate on the calculator how to store a value in a variable to evaluate an expression (i.e. evaluate  $f(x) = -2x^2 - 8x$ , at  $x = -4$ ).

**EVALUATE:** Warmup and independent practice worksheet (over writing and evaluating expressions and finding range, given the domain).

**Algebra I Lesson – Tuesday, November 3, 2009****WRITING DOMAIN AND RANGE; EVALUATING FUNCTIONS****OBJECTIVE(S): STUDENT WILL:**

1. write the domain and range of continuous and discrete functions
2. evaluate expressions

**TEKS:** A.3 - Students use functions to determine one quantity from another, to represent and model problem situations, and to analyze and interpret relationships. A.5.B – determine the domain and range of linear functions in given situations.... A.4.A – find specific function values....

**TAKS:** Obj. 9 - ... find solutions to application problems involving percents and proportional relationships....

**VOCABULARY:** domain, range, probability

**MATERIALS:**

- Warmup over solving proportions and probabilities problems
- Graphing calculators
- Domain and range worksheet
- Quiz 2.1

**ENGAGE:** N/A

**EXPLORE:** N/A

**ELABORATE:** Students will work independently writing the domain and range of functions from various graphs.

**EXPLAIN:**

- Teacher will explain how to write the domain and range of a continuous function that approaches infinity and/or negative infinity.

**EVALUATE:** Quiz over writing domain and range, evaluating a function to find the range, given the domain, interpreting a graph, solving a proportion, and solving a literal equation.

## Supplemental Lesson Plan - Archimedes

### Understanding Functions

**Warm-Up:** TAKS prep

**Engage:** Archimedes Teacher Demonstration

<http://www.mathsonline.co.uk/nonmembers/gamesroom/sims/archi/archi4.html>

**Objective:** Students will connect input, domain, and the value of the x variable; connect output, range and the value of the y variable.

**Explore:** Archimedes Student Activity

<http://www.mathsonline.co.uk/nonmembers/gamesroom/sims/archi/archi4.html>

**Elaborate:** Teacher will use Socratic Method as students explore the functions related to Archimedes to draw out the implications.

**Explain:** Teacher will demonstrate the application of concepts learned through the Archimedes Activity by working examples from the Functions WS with the class.

**Evaluate:** Students will complete Functions WS; odd numbers classwork, even numbers homework. Teacher will use small groups and/or walk around the room to informally assess understanding and explain as needed.

**Wednesday, November 4, 2009**

Identifying Functions: Ordered Pairs, Mapping Diagrams and Tables

**Warm-Up:** TAKS prep

**Engage:** Students N/A

**Objective:** Students will identify functions and domain/range from ordered pairs, mapping diagrams, tables, and graphs.

**Explore:** N/A

**Explain:** N/A

**Elaborate:** N/A

**Evaluate:** Students will evaluate their own accuracy by checking the answer to the riddle for the warm-up and by using the graphing calculator for the classwork. Teacher will assess progress by reviewing the students' classwork.

**Thursday, November 5, 2009**

## Unit Rates, Constant Rates of Change and Application

**Warm-up:** TAKS prep

**Engage:** Think-Pair-Share – Individually the students will come up with 3 rates of change from their own life; listen to their partners ideas; share their ideas with their partner.

**Objective:** Students will be able to determine constant rates of change; solve problems involving constant rates of change; interpret graphs of functions in real world

**Explore:** Rediscover the relationship between vocabulary and algebraic expressions by writing equations for their own ideas derived during Think-Pair-Share activity.

**Explain:** Teacher will explain how the commonly used unit rates are constant rates of change, then introduce constant rates of change other than unit rates.

**Elaborate:** N/A

**Evaluate:** After working problems individually, students will collaborate with their partner to evaluate accuracy. Teacher will direct class discussion to assess and guide correct understanding.

**4<sup>th</sup> period Thursday or Friday** (as time allows in other periods): Graph Bingo - Students will take real life situations and match them to the appropriate graphs.

**Friday, November 6, 2009**

**Writing Functions with Constant Rates of Change**

**Warm-up:** TAKS prep

**Engage:** Think-Pair-Share – Individually the students will come up with a graph from their own life; look at their partners graph and listen to their partner's explanation; share the same with their partner.

**Objective:** Students will be able to write functions involving constant rates of change; interpret graphs, ordered pairs, tables, mappings of functions from both mathematical examples and real world scenarios.

**Explore:** N/A

**Explain:** Teacher will explain how everyday occurrences can be depicted as functions in the form of ordered pairs, tables, graphs and equations or inequalities, then demonstrate through examples.

**Elaborate:** Students will look at real life examples in words and use the data to describe the relationship in terms of ordered pairs, tables, graphs and functions.

**Evaluate:** After working problems individually, students will collaborate with their partner to evaluate accuracy. Teacher will use small groups and/or walk around the room to assess understanding and explain as needed.

**4<sup>th</sup> period Thursday or Friday** (as time allows in other periods): Graph Bingo - Students will take real life situations and match them to the appropriate graphs.